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Patentanmeldung Nr. Patent application No. Demande de brevet n°

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Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
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Apparatus for processing information stored in a data carrier, data carrier and
method for storing a file with a plurality of related sub-files in said carrier.

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PT RO SE SI SK TR LI

The present invention relates to an apparatus for processing information stored in a data carrier in which information can be stored in places defined by a first position indication and by, at least a second position indication

- a carrier head for reading and/or writing data in said data carrier,
- control means for moving said carrier head according to the positions.

This apparatus finds many applications, notably for data carriers constituted by optical discs having a plurality of layers, which are analyzed by a head comprising a laser. In this case, the first indication is provided by a location on the disc where the carrier head must be placed and the second position by the layer on which the laser of the carrier head must be focused.

In such discs, a file may be linked to other sub-files and it is necessary to combine files and sub-files for a right management of the information contained in them. It is the case, notably, for displaying movies with enhancement if the display device enables this possibility.

A known device of this type is disclosed in the patent document US 2002/0054550. In this document no measure for the processing of files and related sub-files is provided.

The invention proposes an above-mentioned apparatus, which enables the processing of files and related sub-files with a relative short access time.

For this purpose, such an apparatus for processing information stored in a data carrier in which information can be stored in places defined by a first position indication and by, at least a second position indication comprises:

- a carrier head for reading and/or writing data in said data carrier,
 - control means for moving said carrier head according to the positions,
- apparatus wherein said information stored in the data carrier is arranged in files and related sub-files in a way that at least a part of a file with its related sub-file is made accessible from said first position.

The invention proposes also a data carrier comprising data organized in files and related sub-files in a way that at least a part of a file with its related sub-file are close together.

Moreover, the invention proposes a method for storing a file with a plurality of related sub-files comprising the steps of:

- placing the file at a given location
- placing the related sub-files close together.

These and other aspects of the invention are apparent from and will be elucidated, by way of non-limitative example, with reference to the embodiment(s) described hereinafter.

Fig.1 shows an apparatus in accordance with the invention.

Fig.2 shows an optical disc involved by the invention.

Fig.3 shows a first embodiment of file disposal according to the invention.

Fig.4 shows a second embodiment of file disposal according to the invention.

Fig.5 shows the second embodiment file disposal without gap between certain files.

Fig.1 shows an apparatus, in which a data carrier 1 is placed. This data carrier may be an optical disc comprising two layers L0 and L1. In the Fig.1, the carrier is shown in cross section. A disc motor 3 rotates the carrier. On this carrier, a lens 12, incorporated in an optical head 13, focuses a laser light beam 14. The focusing is put on the first layer L0 or the second layer L1. This optical head 13 is mounted in an actuator 15 which is mounted in a sledge 16 which can be moved along the radius of the carrier in dependence of the control of electronic circuits, not shown in the fig, acting on a sledge motor 17. Inside this sledge, little movements are allowed thanks to actuator devices. There are actuator devices for the radial positioning referenced by 20 and for focus positioning, referenced by 22. Arrow 26 indicates the directions of focus positioning and the arrow 28 indicates the directions

of radial positioning. The actuator is formed by electro technical elements, as coils, magnet return springs and so on. The sledge contains also photo detectors, which provide signals. These signals are used, on the one hand for the displaying of pictures on a screen 40, for instance, and on the other hand for controlling various servos. A split device 42 directs these signals to the relevant devices. Among them, a signal TRf is used for the focusing via a focusing device 45 and another TRr for the radial positioning via the radial guidance device 50.

In certain cases, the coding uses a base layer file and one or more enhancement layers files called related sub-files. In this technique, a base layer file is used to encode the video stream, for example, with a certain quality, for example a good quality for usage on a small portable screen. If a user wants to display this stream on a (large) screen the enhancement layers files can be used, which provide additional quality to the base-layer stream.

If the enhancement layers files are used, the decoder needs access to corresponding parts of both the base layer files and one or more enhancement layers files. Typically on each layer L0 or L1, the base layer content is stored in separate files. This means that the decoder needs more or less at the same time corresponding data from two or more separate files.

When these separate files are stored on an optical medium the access times to these separate files may become a problem as optical drives have relative large access times compared to e.g. Hard Disc Drives. Using relative large buffers can solve this, and fast optical drives with respect to data-rates. The invention proposes a solution by allocating the separate files smartly on a multi-layer disc

The Fig.2 shows the optical disc for which the measures of the inventions can be applied in a preferred way. The data in a file 110 are stored along a circular track 100 on the layer L0. The center of the disc is Ct. Another track, on the other layer L1, can be provided but it is not visible on this Fig.2. The files concerning a same base file are disposed along a track, which is placed at the same radius Ri and on various layers, so that all the files can be accessed with a very little movement and/or by a shift of the beam.

The relative large access times of optical drives are a result of disc spinning in case of CLV (constant linear velocity) media and the optical head 13 movements. Focusing on another layer in case of multi-layer discs is however a very fast process in itself (i.e. when both access points are on the same radii R_i and no optical head movement or disc spinning are required).

The measures provided by the invention are to allocate the various files of the multiple layers (base and enhancement) such that the total overhead time (mainly caused by jumping over the disc) is minimized. Below the basic idea is shown for a dual layer disc for a base layer and two enhancement layers

In the example, see Fig.3, the base layer file BL is located in four extents on layer L0 of the disc. The enhancement layers or related sub-files EL1, EL2 are located on layer L1 of the disc. The corresponding parts of the three files (base layer and two enhancement layers) are located as much as possible on the same radii R_i (but on different layers) at given position P1, P2, P3 and P4. From this given position it easy and fast to access the files on L0 and L1 by shifting the focusing.

The sizes of and the number of extents chosen has been given only as examples. This also means that the number of extents of the file containing the base layer and the number of extents of the files containing the enhancement layers don't have to be equal (as they are in the example). Also the location of the base layer file on L0 and the enhancement layers sub-files on L1 as shown in Fig.4 and Fig.5 may be interchanged. Of course many other examples can be thought of.

Normally the base layer files and the enhancement layers files do not differ in size extremely, thereby allowing to use the allocation structure as given in the Fig.3. However there are no restrictions to the sizes of the various layers, so in theory it is possible to have a large base layer and a small enhancement layer or the other way around. In the example shown in Fig.4 a possible allocation is given for a small base layer and a relative large enhancement layer.

In this example shown in Fig.4, on the layer L0 of the disc, representing an extent of the base layer file (a) is read, followed by the corresponding extent of the enhancement layer file on sub-file (b) and the extent of another sub-file (c) on the layer L1. After that, the same sequence is followed for the other extents or other sub-file (d and so on).

In both examples there is some space or gap left between the extents (on each of the disc layers). This is in the first place done to make the drawings clearer. In usual cases, no space is left between the extents (however it is of course allowed to leave this space). To clarification purpose, the example shown in Fig.4 is redrawn below with the extents contiguously on disc. See Fig.5

The advantages of this way of allocating the various corresponding files on disc can be found in the field of total performance of the drive system as less time spent on jumping leaves more time to read data. Next to that there are also advantages in the total power consumption (less time spent on jumping leaves time to switch parts or the entire drive off for some periods of time, thereby saving power), noise reduction by jumping less, wear of the drive due to the jumping etc.

An advantage on a whole different issue is related to the defect management. Suppose a scratch on the disc surface ruins some data. Such a scratch typically causes data to be lost on both the first and second layer. By allocating the data as always said, this leads to the loss of a (more or less related) part of the video for both the base layer and the enhancement layers. This is an advantage, because when the base layer file is lost, the information in the enhancement layer is of no value anymore. Therefore it is better to loose the corresponding information of the enhancement layer than some other information at another point in the video stream.

Although in practice with small errors the data lost in the two files on both disc layers won't correspond entirely from a timing point of view, with large error regions this will be the case.

The invention concerns also the management of the defects on an optical disc from the above considerations.

CLAIMS.

- 1- An apparatus for processing information stored in a data carrier in which information can be stored in places defined by a first position indication and by, at least a second position indication
- 5 - a carrier head for reading and/or writing data in said data carrier,
- control means for moving said carrier head according to the positions,
apparatus wherein said information stored in the data carrier is arranged in files and related sub-files in a way that at least a part of a file with its related sub-file is made accessible from said first position.
- 10 2- An apparatus as claimed in claim 1, wherein the data carrier is a removal one.
- 3- An apparatus as claimed in claims 1 or 2 wherein the data carrier is an optical disc comprising at least two layers, first position defining a location on the area of the disc and the second position the concerned layer.
- 15 4- An apparatus as claimed in any claims 1 to 3 where means are provided for managing a defect in a file from other related files.
- 5- A data carrier suitable for a device as claimed in one claim an apparatus as claimed in claims 1 or 2 or 3 or 4, comprising data organized in files and related sub-files in a way that at least a part of a file and its related sub-file are close together.
- 20 6- A data carrier as claimed in claim 5 constituted by an optical disc having at least two layers, wherein the files with its related sub-files are on different layer in same location of the disc.
- 7- A data carrier as claimed in claim 6 wherein the files and related sub-files are placed close together in one or a plurality of layers.
- 25 8- A method for storing a file with a plurality of related sub-files comprising the steps of:
- placing the file at a given location,
- placing the related sub-files close together.
- 9- An optical head suited for an apparatus as claimed in claims 1 to 4.

Apparatus for processing information stored in a data carrier, data carrier and method for storing a file with a plurality of related sub-files in said carrier.

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ABSTRACT.

This apparatus is designed for processing information stored in a data carrier in which information can be stored in many layers (L0, L1, ...) Often said information is arranged in files-and related sub-files. It is proposed to arrange the file and the related sub-file in the same vicinity so that a displacement from main file and to a related sub-file is quickly made and vice versa.

Application: video stream, for example, which have a certain quality. For example, the quality is good for usage on a small portable screen. If a user wants to display this stream on a (large) screen the enhancement sub-files placed on other layers can be used, which provides additional quality to the base-layer stream.

Fig.3

A diagram of a circular cross-section of a container. It features a central core labeled 'Ct' with a star-like symbol inside. A dashed circle is labeled 'Ri' with an arrow pointing to it. The outer boundary is a solid circle labeled '110'. A dashed line segment is labeled '100'.

FIG.2

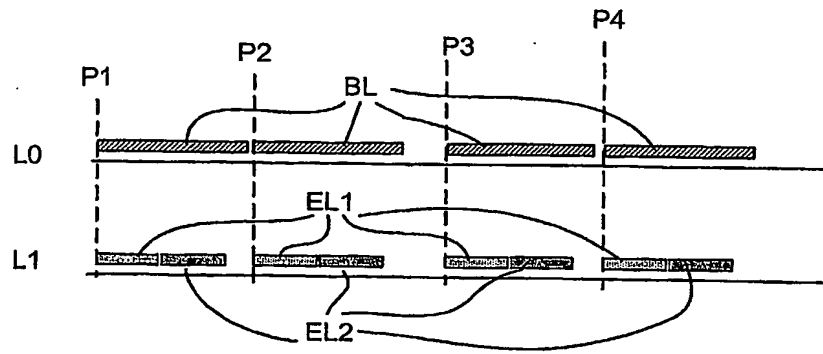


FIG. 3

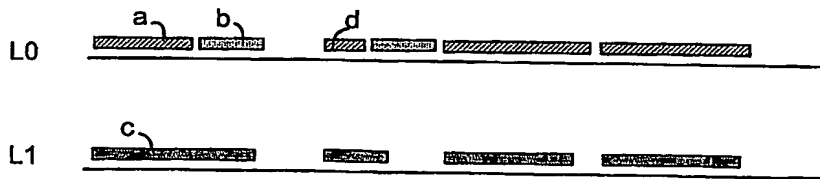


FIG. 4

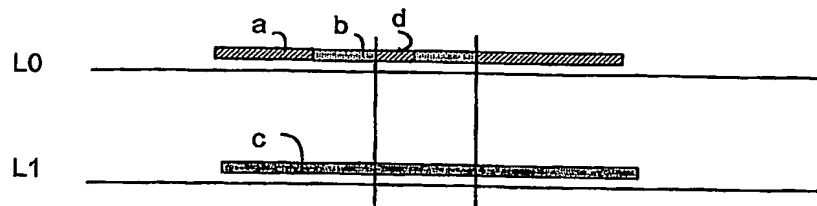


FIG. 5

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